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The apprenticeship system in the United States is a method of training for a vocation or skilled trade within the framework of a relatively free labor market. It is a system which furnishes training through employment and one which is affected by the employment level of a given period. This is particularly important as the apprenticeship typically lasts 4 years, and the apprentice need at the termination of the training period may not be the apprentice intake based on the employment level 4 years earlier. The declining trend in apprenticeship since World War II cannot be attributed to any single cause, but the increased number of persons who continue their formal education seems to be the major one. Major factors which affec of apprentices are (1) irregula'y of employment rate, (2) the completion rate, (3) unemployment, (4) college and apprentice enrollment, and (5)the ratio between craftsmen and professional-technical personnel. Statistical analysis indicates no significant relationship between the number of apprentices and the number of journeymen. Although apprentice numbers appear to have been small due to employer reluctance to train skilled workers rather than to union policy, relatively little consideration has been given to the system itself, the factors affecting the employer's decision to hire apprentices, nor the factors affecting the apprentice's decision to enter or complete such a training program. (EM)

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APPRENTICESHIP and *ECONOMIC CHANGE*

U. S. DEPARTMENT OF LABOR, W. Willard Wirtz, Secretary
MANPOWER ADMINISTRATION, Bureau of Apprenticeship and Training

Technical Report No. 3

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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A Note On:

APPRENTICESHIP
AND
ECONOMIC CHANGE

U. S. DEPARTMENT OF LABOR

Manpower Administration

Bureau of Apprenticeship and Training

1964

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INTRODUCTION

The apprenticeship system in the United States today is a method of training for a vocation, or more specifically, for a skilled trade operating within the framework of a relatively free labor market.

The apprentice is free to leave the employer, and generally, subject to collective bargaining agreements, the employer is at liberty to lay off or to discharge the apprentice.

As a result, American apprenticeship rests on two interrelated paradoxes. The first concerns the "ends and means" of the system. Although its "end" is the training of well-rounded craftsmen, as presently constituted the apprenticeship system can achieve its objective only by the "means" of employment of the apprentice. He is an employee--a worker who acquires his skill almost wholly on the job, earning wages from work with a designated employer. He produces, and his product is sold. The apprentice's training ceases when his employment ceases or is interrupted. Achievement of the "end" of craft training, therefore, depends wholly on the availability of employment for apprentices. No matter how excellent the training might be, it cannot be transmitted to the apprentice unless he is employed. Thus, although the apprenticeship system is in a sense a form of vocational training, the system can be operational only as a form of employment.

The second paradox concerns time. An apprentice generally learns his craft in four years, and in some instances in as many as five or six years. To insure a supply of apprentices who will have completed their apprenticeships four years hence, for example, employment of a sufficient number of first year apprentices must begin in the present year. Thus, if shortages in the number of skilled craftsmen are anticipated in the future, employment of apprentices must be increased in the present--even if currently depressed employment opportunities for apprentices may make such increased employment economically difficult or impossible.

Much of the current discussion of the apprenticeship system in the United States centers about the effectiveness with which it has added to, or can be expected to add to, the supply of skilled craftsmen. Considerable emphasis has also been devoted to the relationship between the present number of apprentices and the projected need for skilled craftsmen in the future. Relatively little consideration has been given to the apprenticeship system itself, and to the socio-economic factors which affect the employer's decision to hire apprentices, the decision by a young man to become an apprentice, or the decision by an already indentured apprentice to complete his term of apprenticeship or to accept employment elsewhere.

These three factors are examined in the context of apprenticeship primarily as a form of employment which should be considered not only in terms of its relationship to the supply and demand for craftsmen, but also as a response to the complex tides of the labor market and of the economy.

This report was prepared by David J. Farber in the Division of Research, Bureau of Apprenticeship and Training, Mildred S. Barber, Chief.

1--THE NUMBER OF NEW APPRENTICES

The Ratio of Apprentices to Craftsmen

Between 225,000 and 250,000 bona fide apprentices are estimated to have been actively engaged in learning their crafts in 1962.[1/] About 160,000 of these apprentices were receiving their training under programs registered either with the Bureau of Apprenticeship and Training or with State apprenticeship agencies, and it is the data for registered apprentices for the 1947-62 period on which this report is based.

In the majority of cases, the 160,000 registered apprentices were receiving training in accordance with apprenticeship standards established

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1/ See Number of Apprentices: 1962, Bureau of Apprenticeship and Training, U. S. Department of Labor, 1964.

by collective bargaining agreements. Typically, such agreements provide for a ratio of apprentices to craftsmen. The effect of these ratios on the employment of apprentices has never been established. Available evidence suggests, however, that despite the widespread use of these provisions in labor agreements, there is no necessary relationship between the number of employed craftsmen and the number of employed apprentices, or between the year-to-year changes in the number of employed workers in either group.

During the post-World War II period, for example, as table 1 and figure 1 make clear, the number of new apprentice registrants declined from 94,000 in 1947 to 49,000 in 1961, while the annual average number of employed male craftsmen increased from about 7.6 million in 1947 to 8.4 million in 1961. Furthermore, in any number of instances, there were differences between the direction of year-to-year changes in the number of new apprentices and in the annual average number of employed male craftsmen. From 1947 to 1948, the number of new apprentices declined while the annual average number of craftsmen increased; other contradictory year-to-year changes in the employment of apprentices and the annual average number of craftsmen also occurred in 1949-50, 1951-52, 1952-53, and 1960-61. Measurement of the extent to which the annual average employment of craftsmen and the employment of new apprentices were related during the entire 1947-62 period resulted in a negative correlation which was statistically insignificant. 2/

Statistical inference, therefore, indicates that there is no significant relationship between changes in the number of new apprentices and the number of journeymen craftsmen. This indication also seems to be borne out by another factor not directly related to economic change but which should be mentioned in passing. This is the apprentice ratios to journeymen included in many labor agreements. This factor is often cited as a determining and limiting influence on the number of new apprentices hired in any one year. Impartial observation of this factor gives ample grounds for concluding that the apprenticeship policies reflected in such agreements "...seem to have had virtually no effect on the number of journeymen. The number of apprentices has been small but this has been due to the reluctance of most employers to train skilled workers rather than to union policies. Indeed, nonunion employers who were free from union restrictions have trained fewer apprentices than did union employers." 3/

2/ It should be noted that the statistics on new apprentice registrants are annual unduplicated employment data, but the statistics on craftsmen refer to annual average employment in this occupational group. The comparison, therefore, is not intended as a precise measure of the craftsmen--new apprentice registrant ratio because, in a very real sense the data are at best only grossly comparable.

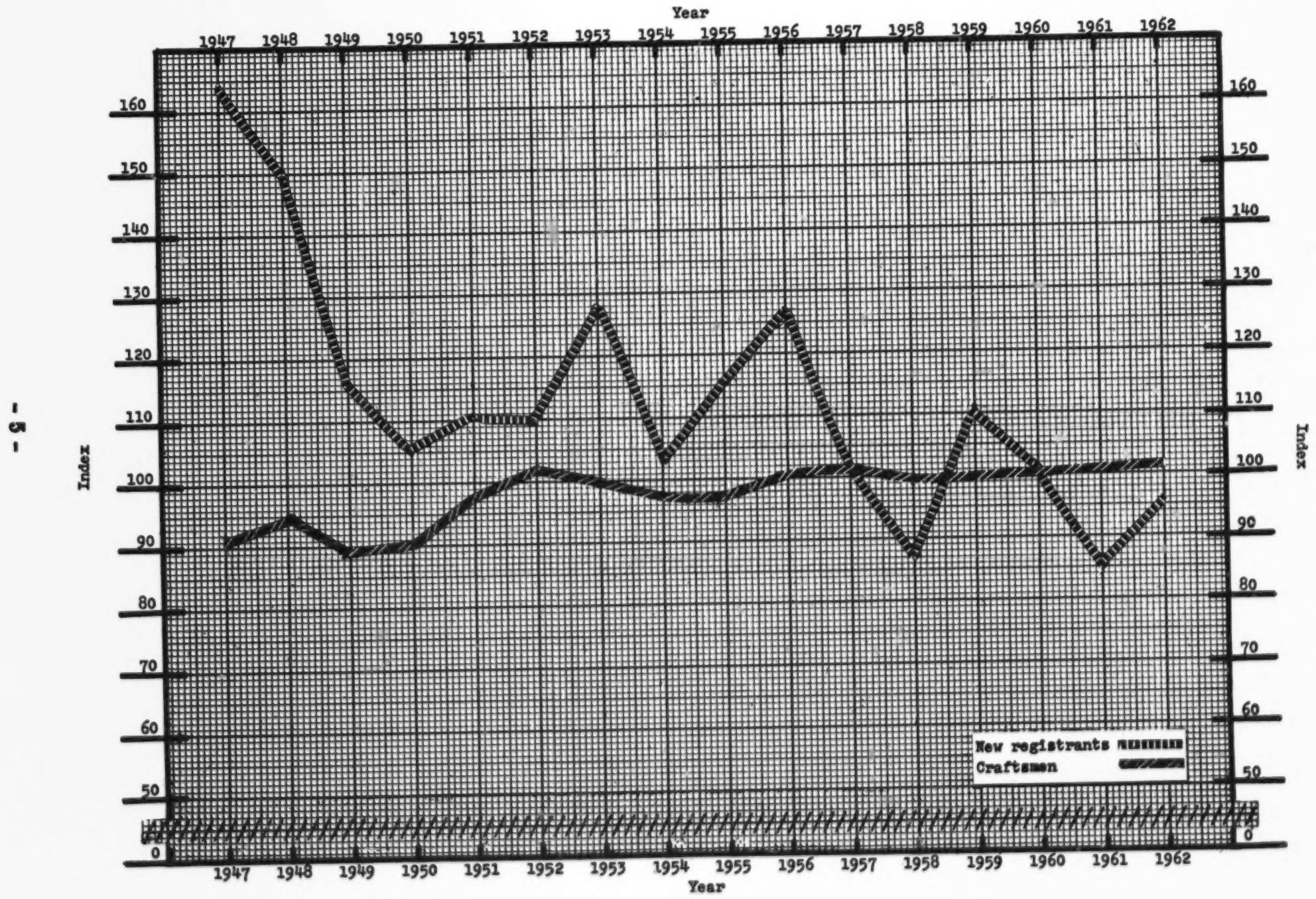
3/ Slichter, Healy, and Livernash, The Impact of Collective Bargaining on Management, The Brookings Institution, Washington, D. C., 1960, p. 74.

Table 1--Number and indices of annual average employed male craftsmen and new apprentice registrants, 1947-62

Year	Number		Indices (1957-59 = 100.0)	
	Annual average employed male craftsmen and kindred workers (000)	New apprentice registrants	Annual average employed male craftsmen and kindred workers	New apprentice registrants
1947	7,565	94,238	90.7	164.1
1948	7,924	85,918	95.0	149.6
1949	7,453	66,745	89.3	116.2
1950	7,482	60,186	89.7	104.8
1951	8,193	63,881	98.2	111.2
1952	8,480	63,055	101.7	109.8
1953	8,325	73,198	99.8	127.5
1954	8,073	58,970	96.8	102.7
1955	8,114	66,747	97.3	116.2
1956	8,457	72,869	101.4	126.9
1957	8,432	58,463	101.1	101.8
1958	8,244	50,134	98.8	87.3
1959	8,349	63,679	100.1	110.9
1960	8,338	58,129	99.9	101.2
1961	8,407	48,889	100.8	85.1
1962	8,455	55,321	101.4	96.3

Source: Table A-7, 1964 Manpower Report of the President, p. 199 and Trends in Apprentice Registrations, 1941-62, Bureau of Apprenticeship and Training, U. S. Department of Labor.

Figure 1--Indices of annual average employed male craftsmen and new apprentice registrants, each year, 1947-62 (1957-59 = 100.0)



Unemployment and the Number of Apprentices

Because no relationship could be discerned between the apprentice-ratio provisions in collective bargaining agreements and the number of new apprentices, it was decided to investigate the relationship between year-to-year fluctuations in the number of apprentices to some of the many indices of economic change. More explicitly, it was hypothesized that both the number of new apprentices and the rate at which they complete their terms of apprenticeship are related to fluctuations in unemployment. The hypothesis appears realistic, in the light of generally declining trends in apprentice registrations for the post-World War II period, as shown in the Appendix.

Table 2 shows clearly the secular decline in the number of new apprentice registrants. During the post-World War II years, the number of new apprentices decreased from an average of 82,300 per year for 1947-49; to 63,858 for 1950-54; to 62,378 for 1955-59; to a drastically new low of 54,113 for 1960-62. While it is possible that the 1947-49 average--because it reflects the sudden influx of returning World War II veterans anxious to resume interrupted careers--is abnormally high, the decline as measured from 1950-54 or from 1955-59 to 1960-62 is still of substantial magnitude. The average annual number of new apprentice registrants in 1960-62 is approximately 16 percent below the average for 1950-54, and about 13 percent below the annual average for 1955-59. The evidence of a substantial and continuing decline in the number of new apprentice registrants is clear and unmistakable. The extent to which this decline is caused by lack of interest--either on the part of employers, of unions, or of young people--or by the increased frequency and severity of unemployment--cannot, of course, be determined from these data.

Evidence is available which indicates that irregularity of employment, and unemployment, affects apprentices to a greater degree than other occupational groups. Data from the 1960 Census, for example, indicate that among male workers, only 52 percent of the apprentices had been employed for 50-52 weeks in 1959, as contrasted with 76 percent of the clerical workers, 75 percent of the sales workers and 68 percent of the craftsmen. Indeed, the proportion of apprentices employed the year-round was substantially lower than the 63 percent of the operatives, or the 66 percent of the service workers who had been employed for 50-52 weeks in 1959.[4/] A survey of apprentices in the State of California, also disclosed that as of April 1962, a relatively large number of apprentices had been unemployed for an extended period of time. Of the 6,172 apprentices who responded to questions on employment, 697 (11 percent) had been unemployed for more than 12 weeks, and 1,492 (24 percent) had been unemployed for five or more weeks during the previous 12 months.[5/] These data suggest that demand for the services of apprentices is quite elastic, and fluctuates considerably from year to year. Unemployment might therefore

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4/ Table 208, U. S. Census of Population, 1960, U. S. Summary, PC(1)-1D.

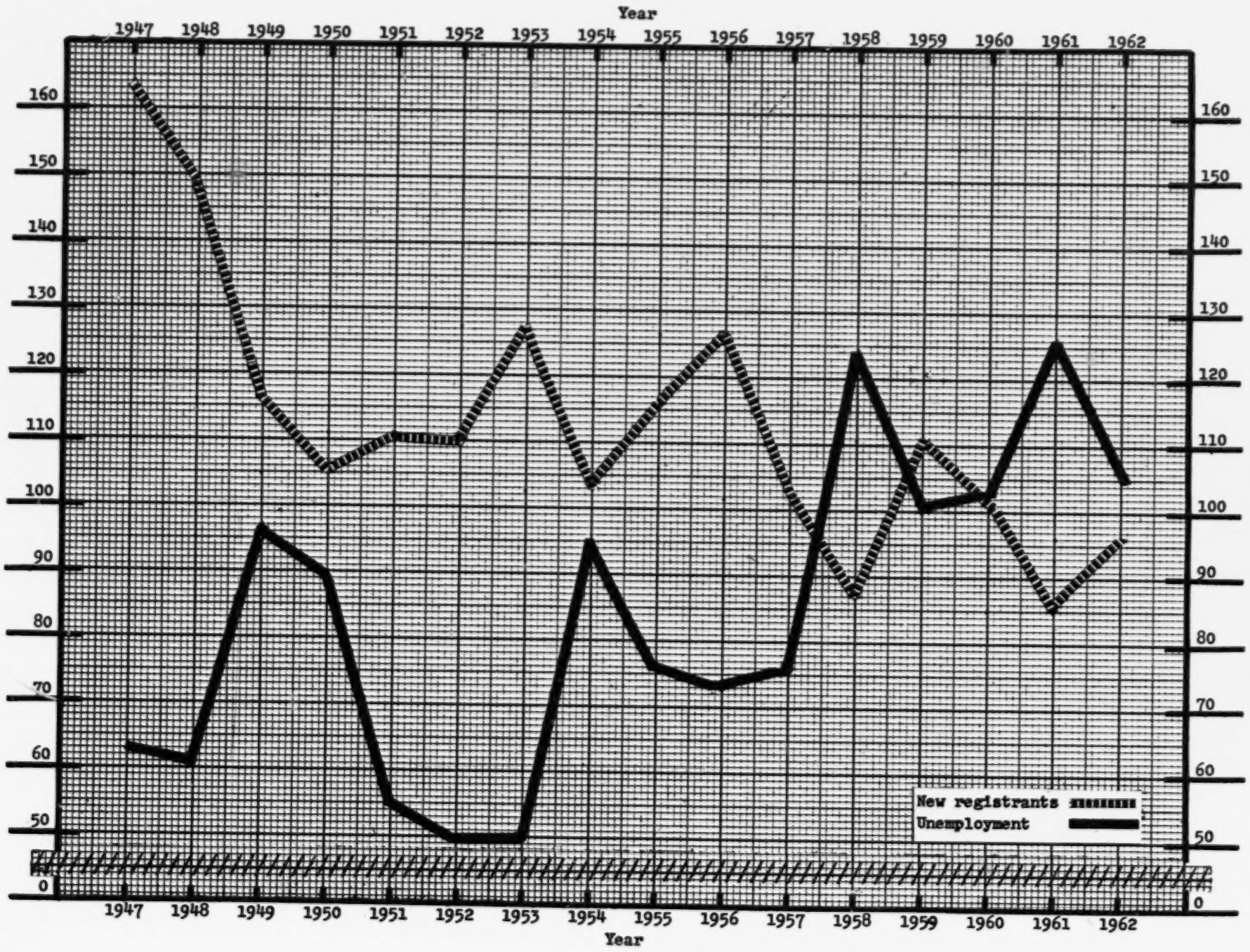
5/ Preliminary Report on Survey of Active Apprentices, Division of Apprenticeship Standards, Department of Industrial Relations, State of California, April 1962.

Table 2--Number and indices of unemployment and new apprentice registrants, 1947-62

Year	Number		Indices (1957-59 = 100.0)	
	New apprentice registrants	Unemployment (in millions)	New apprentice registrants	Unemployment
1947	94,238	2.4	164.1	63.2
1948	85,918	2.3	149.6	60.5
1949	66,745	3.7	116.2	97.4
1950	60,186	3.4	104.8	89.5
1951	63,881	2.1	111.2	55.3
1952	63,055	1.9	109.8	50.0
1953	73,198	1.9	127.5	50.0
1954	58,970	3.6	102.7	94.7
1955	66,747	2.9	116.2	76.3
1956	72,869	2.8	126.9	73.7
1957	58,463	2.9	101.8	76.3
1958	50,134	4.7	87.3	123.7
1959	63,679	3.8	110.9	100.0
1960	58,129	3.9	101.2	102.6
1961	48,889	4.8	85.1	126.3
1962	55,321	4.0	96.3	105.3

Source: Bureau of Apprenticeship and Training and Table A-1, 1964 Manpower Report of the President, p. 195.

Figure 2--Indices of unemployment and number of new apprentice registrants, each year, 1947-62 (1957-59 = 100.0)



affect, or perhaps determine, the number of apprentices in training. To measure yearly fluctuations in unemployment, use was made of an index of unemployment, utilizing 1957-59 as a base.[6/] This index, together with the index of the annual number of new registrants, was graphed for the 1947-62 period, as shown in figure 2.

Figure 2 illustrates the close negative relationship between annual changes in the indices of unemployment and fluctuations in the number of new apprentice registrants. With the exception of 1950--a year in which the Korean War began and which may have resulted in a reduction in the number of young people available for apprenticeships--the years in which unemployment is at the highest levels are almost invariably the years in which the number of new apprentice registrants fall to their lowest levels. Thus, in the recessions of 1954, 1958, and 1961, as unemployment peaks, the number of new apprentice registrants drops to successively lower levels, and then begins to increase as the level of unemployment in the succeeding years of the cycle falls. The inverse relationship between these two variables is reflected in a rather high negative correlation coefficient, which was .68 (significant at the 1 percent level). Not only are the unemployment rates of young people substantially higher than average, but it is apparent from the correlation, and from figure 2, that changes in unemployment are closely associated with changes in the number of new apprentice registrants.

2--THE APPRENTICESHIP COMPLETION RATE

Two factors vitally affect the total number of apprentices who complete their terms of apprenticeship and become full-fledged journeymen craftsmen. The first--the number of newly registered apprentices--sets the outermost limits. Other things being equal, the number of apprentices who will successfully complete their terms of apprenticeship cannot exceed the initial number of new registrants. The relationship between unemployment and the number of new registrants has already been discussed.

Apprentice Completion Rates

The second major element which helps determine the number of apprentices who successfully complete their terms is the completion rate. To calculate completion rates, the number of apprentices completing their terms in any of the years of the 1950-62 period was expressed as a percentage of the number of apprentices who were newly registered four years earlier. For 1950, for example, the number of apprentices who completed their terms in that year was expressed as a percentage of the number who were newly registered in 1947 (Bureau of Apprenticeship and Training data on apprentices are on a calendar year basis. Thus, the 1947-50 period is inclusive--i.e., it encompasses four calendar years). Since the typical apprenticeship term is

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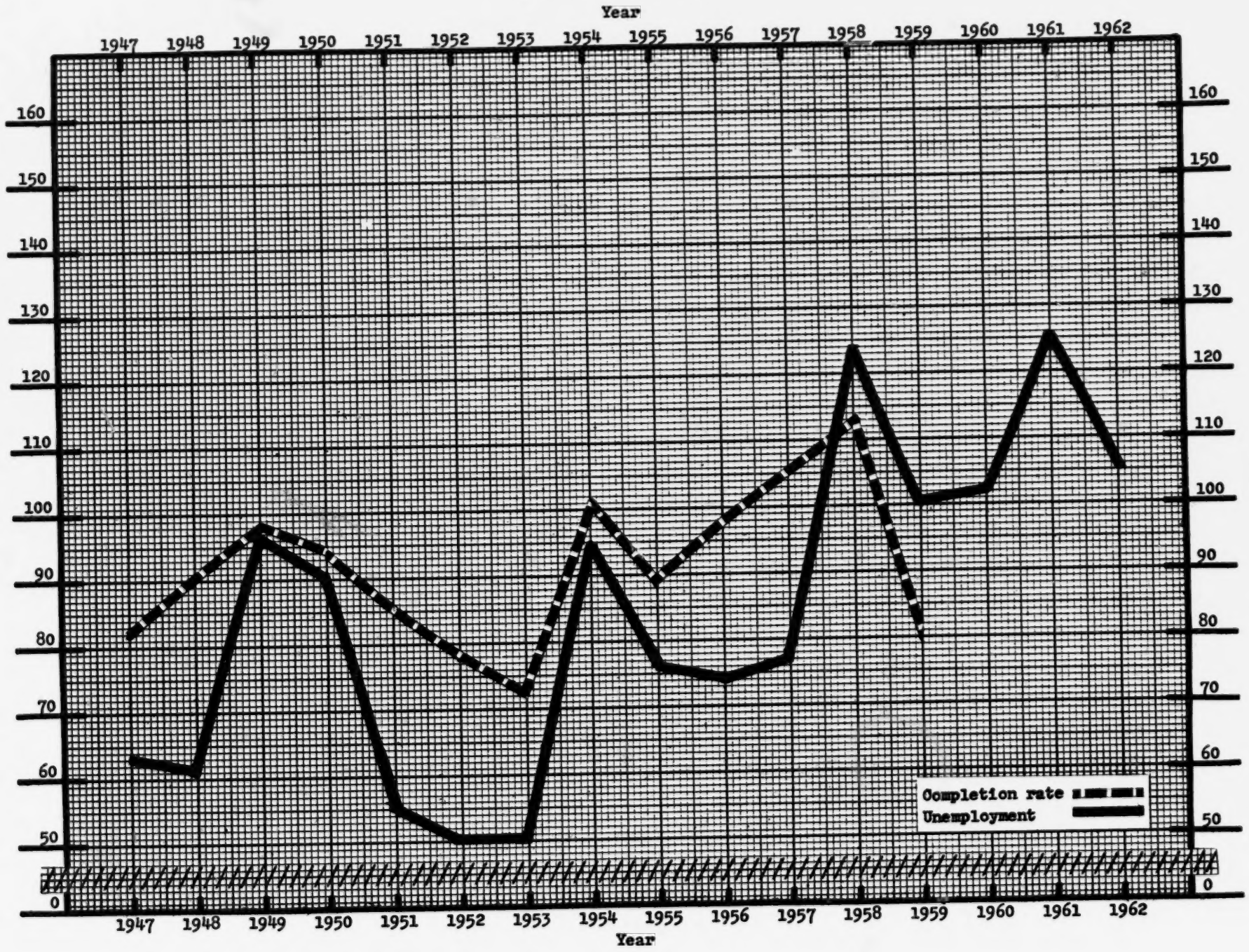
6/ Relationships between these two variables have been analyzed on the basis of fluctuations in their respective indices because of the differences in magnitude of the two variables.

Table 3--Number and indices of new apprentice registrants, unemployment, and apprenticeship completion rates

Year	Number			Indices (1957-59 = 100.0)		
	New registrants'	Unemployment (in millions)	Completion rates (per 100 new registrants four years previously)	New registrants	Unemployment	Completion rate
1947	94,238	2.4	40.9	164.1	63.2	81.8
1948	85,918	2.3	45.1	149.6	60.5	90.2
1949	66,745	3.7	49.1	116.2	97.4	98.2
1950	60,186	3.4	47.2	104.8	89.5	94.4
1951	63,881	2.1	42.5	111.2	55.3	85.0
1952	63,055	1.9	38.8	109.8	50.0	77.6
1953	73,198	1.9	36.2	127.5	50.0	72.4
1954	58,970	3.6	50.5	102.7	94.7	101.0
1955	66,747	2.9	44.7	116.2	76.3	89.4
1956	72,869	2.8	49.0	126.9	73.7	98.0
1957	58,463	2.9	52.9	101.8	76.3	105.8
1958	50,134	4.7	56.4	87.3	123.7	112.8
1959	63,679	3.8	40.7	110.9	100.0	81.4
1960	58,129	3.9	----	101.2	102.6	-----
1961	48,889	4.8	----	85.1	126.3	-----
1962	55,321	4.0	----	96.3	105.3	-----

Source: Bureau of Apprenticeship and Training and Table A-1, 1964 Manpower Report of the President, p. 195.

Figure 3--Indices of unemployment, each year, 1947-62, and of completion rates of new apprentice registrants, each year, 1947-59 (1957-59 = 100.0)



four years in duration, this technique simulates a cohort, because it assumes that all apprentices who completed their terms in any given year were members of the class which first entered into apprenticeship four years earlier. In the strictest sense, this is not completely accurate since there is a known number of apprentices who are reinstated each year, following a period in which they had withdrawn from apprenticeship status or had been temporarily suspended. There is thus a certain degree of error in the data on completion rates. The number of reinstatees, however, is relatively small, and the error involved does not significantly affect the general magnitudes of the completion rates shown in table 3.

The data in table 3 indicate that in none of the years of the post-World War II period did the completion rate reach the 60 percent level. In most instances, the number of completees per 100 new registrants fluctuated between 40 and 50, averaging 45 per 100 new registrants in 1947-49; 43 per 100 for 1950-54; and 49 per 100 for 1955-59. (As used here, completion rates for these years, it should be remembered, relate to the number of new registrants in 1943-45, 1946-50 and 1951-55, respectively.) Despite the fact that the completion rate per 100 new registrants increased by almost 14 percent from 1950-54 to 1955-59, this increase was not of sufficient magnitude to counterbalance the proportionately greater decline in the number of new registrants. Thus, the average annual number of apprentices completing their terms of apprenticeship declined from 33,119 for 1950-54, to 29,256 for 1955-59, and to a new low of 28,373 for 1960-62. From 1950-54 to 1960-62, therefore, the average annual number of apprentices who completed their terms of apprenticeship declined by more than 14 percent.

Unemployment and Completion Rates

The fluctuations in completion rates, and the increase in these rates from 1950-54 to 1955-59, appear to be closely related to the level of unemployment, and to the increased frequency and intensity of unemployment following the recession year of 1954. As figure 3 indicates, from 1947 through 1962, the indices of completion rates and of unemployment follow substantially parallel paths.[7/] In the recession years of 1949, 1954, and 1958 the level of unemployment peaks--as do the completion rates. In the interim years, the downward movements of the index of unemployment are generally duplicated by the movements of the index of apprentice completion rates. The close association between these two variables is indicated by a positive correlation coefficient of .72 (significant at the 1 percent level)--an unusually close association indeed.

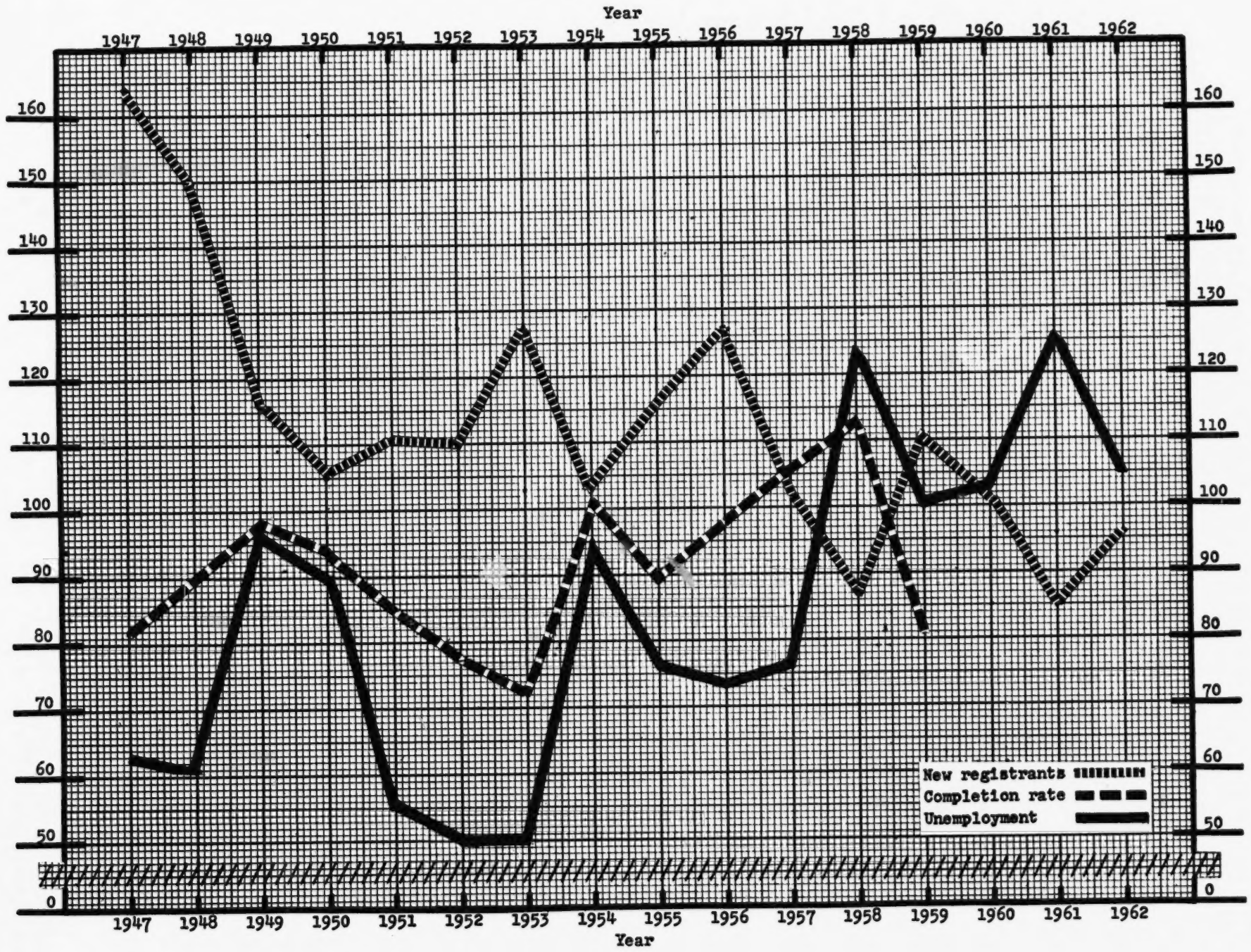
3--UNEMPLOYMENT, NEW REGISTRANTS, AND COMPLETION RATES

Apprenticeship and Cyclical Change

Figure 4 presents in graphic form a composite picture of the two elements which, for analytical purposes, have been considered independently.

7/ See footnote 8.

Figure 4--Indices of unemployment and new apprentice registrants, each year, 1947-62, and of completion rates of apprentices, newly registered, each year, 1947-59 (1957-59 = 100.0)



Changes in both the number of new registrants, and the rate at which they complete their terms of apprenticeship, it has been hypothesized, are related to fluctuations in the level of unemployment. Annual changes in the number of new registrants, the data indicate, vary inversely with changes in the number of unemployed. Fluctuations in the completion rates, however, parallel closely the year-to-year changes in the level of unemployment. The extent to which these three variables are closely associated is measured by the two unusually high coefficients of correlation.

These findings suggest a theory which may contribute to some understanding of current trends in apprenticeship. There is evidence that the apprentice-craftsmen ratio provisions in labor agreements--which purport to control the number of young people who may be employed as apprentices--in fact are not determinative, but permissive. Examination of many of these provisions indicates that generally they set limits to the number of apprentices who may be indentured; usually, they do not prescribe a minimum number who must be apprenticed. Since apprentices must hold jobs if they are to be trained in their crafts, demand for their services fluctuates in accordance with economic conditions and changes in unemployment levels. In recession years when unemployment is high, few unions or employers will agree to the employment of new apprentices when those already in training on the job, or perhaps even skilled journeymen, may be faced with joblessness. Since apprentices are least productive during the initial year of their terms of apprenticeship, in recession years employers are likely to be loath to encumber their work force with newly registered apprentices. As a consequence, in recession years the number of newly registered apprentices tends to fall. As alternative sources of more lucrative employment decline during the downturn in the business cycle, apprentices already employed and in training find it increasingly advantageous to retain their apprenticeships. Their completion rates, therefore, tend to rise as the number of new registrants declines.

During the upturn in the cycle these tendencies are reversed. As unemployment declines, demand for new apprentices may be assumed to increase, and the number of new registrants rises. Concomitantly, however, during the upturn apprentices already in training discover that alternative sources of employment appear to offer greater opportunities, or earnings which exceed their own. 8/ They leave their apprenticeship--and depending upon the extent to which they have completed their terms of apprenticeship--accept jobs either as journeymen, or perhaps in some other occupation. In either eventuality, the "pull" of other and apparently more attractive jobs results in a substantial decline in the completion rate.

8/ In 1959, median earnings of apprentices, as reported in the 1960 Decennial Census were $3,486. Median earnings of operatives were $4,299; of operatives in manufacturing industries were $4,447; of bus drivers, $4,411; of assemblers, $4,491; of truck drivers, $4,221. In these and other semi-skilled occupations, median earnings were higher than those of apprentices. Presumably, workers were required to have much less extensive training than apprentices. Table 208, U. S. Census of Population, 1960, U. S. Summary, PC(1)-1D.

Figure 5--Relationship between indices of unemployment and of new apprentice registrants, each year, 1947-62 (1957-59 = 100.0)

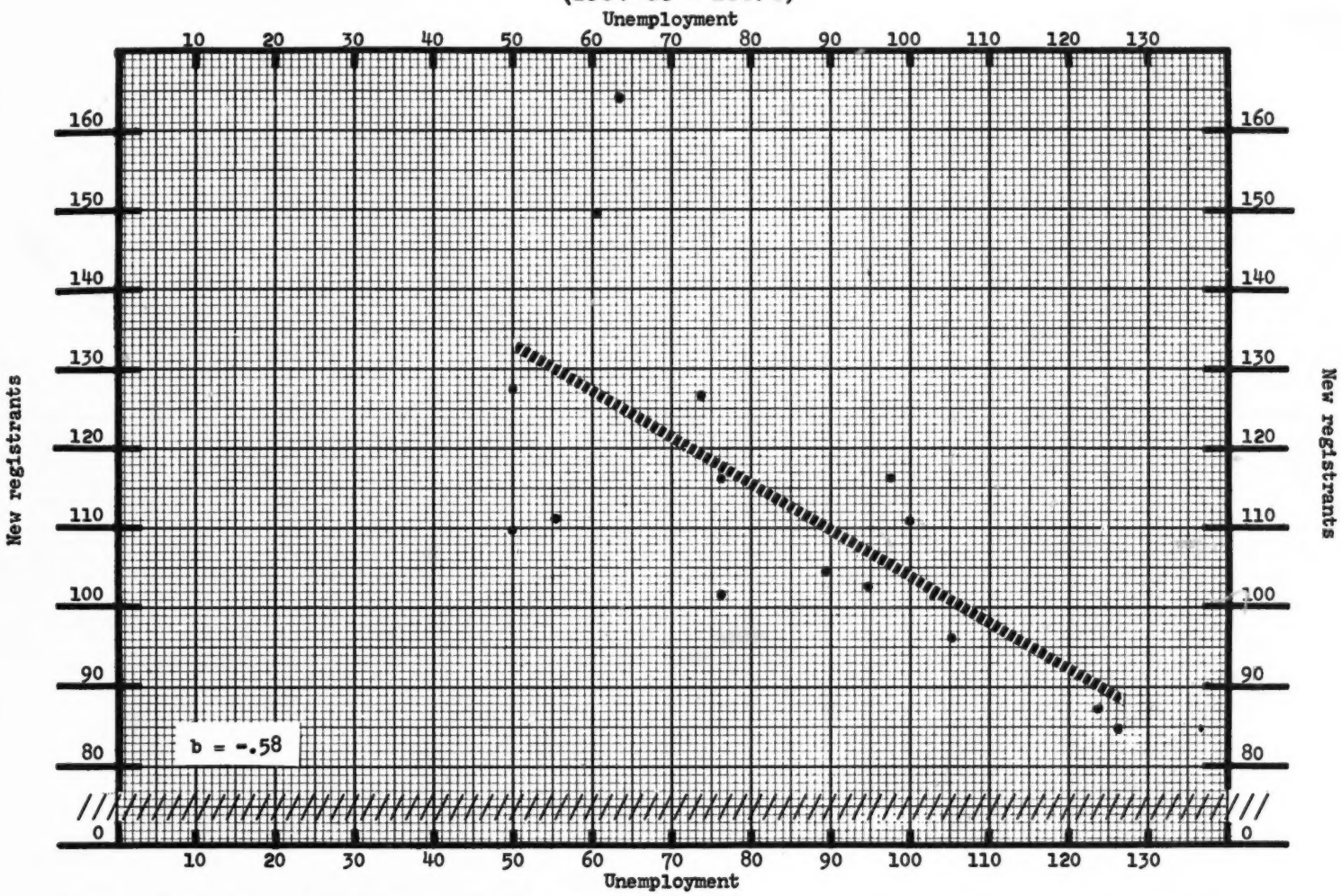
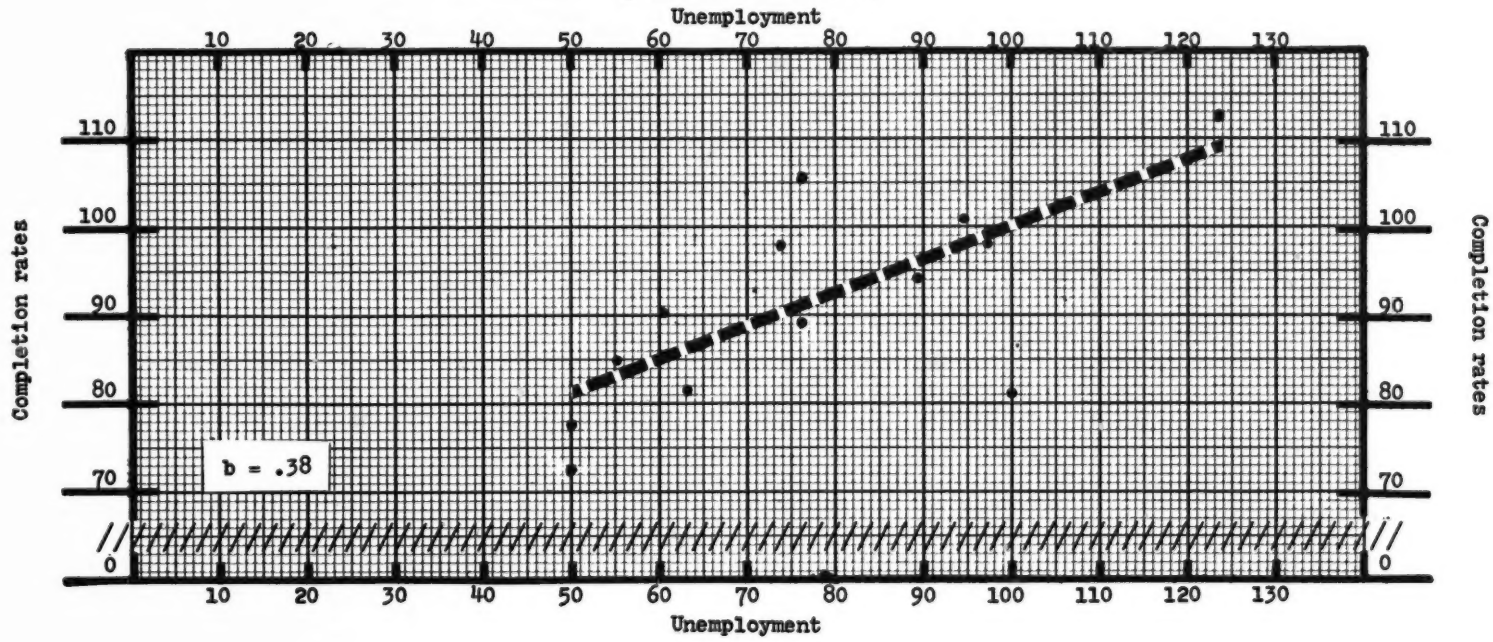


Figure 6--Relationship between indices of completion rates of apprentices newly registered, each year, 1947-59 and of unemployment, each year, 1947-62 (1957-59 = 100.0)



The Downward Trend in Apprenticeship

The association between rising unemployment and the declining numbers of apprentices in the post-World War II period is reflected in figure 5. Each point plotted in that figure indicates for a given year in the 1947-62 period the relationship between the index of unemployment and the index of the number of newly registered apprentices. For the period as a whole, the data indicate, an increase of 1 percent in the index of unemployment, on the average, has been accompanied by a decrease of 0.6 percent in the index of newly registered apprentices. Figure 6, on the other hand, indicates that during the same period a 1 percent increase in the index of unemployment, on the average, has been accompanied by a 0.4 percent increase in the index of completion rates. The index of newly registered apprentices, these data indicate, reacts to increasing unemployment even more sensitively than the index of the completion rate of apprentices already indentured. Thus, even though completion rates rise with increasing unemployment, the increase is not as great as the percentage decline in newly registered apprentices. Hence, the downward trend in apprenticeship in the post-World War II period.

4--EDUCATIONAL AND OCCUPATIONAL FACTORS

College Enrollment and Apprenticeship

The declining trend in apprenticeship since the close of World War II probably cannot be attributed to any one single cause. Certainly, rising unemployment and major changes in the occupational composition of the employed labor force may be said to have played major roles. Further research may indicate that current trends in education have also been partially responsible. Calculations based on data published by the U. S. Department of Health, Education and Welfare, indicate that the proportion of high school graduates who become first-time college students has increased substantially from 1950 to 1960. During this period, as shown in table 4, the number of first-time college students per 1,000 high school graduates increased from 406 in 1950 to 528 in 1960.

The upward trend in the proportion of high school graduates entering college may mean that some of the abler high school graduates, who in pre-World War II years might have become apprentices, are now continuing their education at the college or university level. As a result, the young people interested in becoming apprentices may not be of quite as high a calibre as in the pre-World War II years, and those who enter, therefore, may be less able to complete their terms of apprenticeship. Further research in this area may disclose some significant similarities between trends in education and in apprenticeship.

Figure 7--Ratio of annual average employed craftsmen to annual average employed professional and technical workers, 1947-62

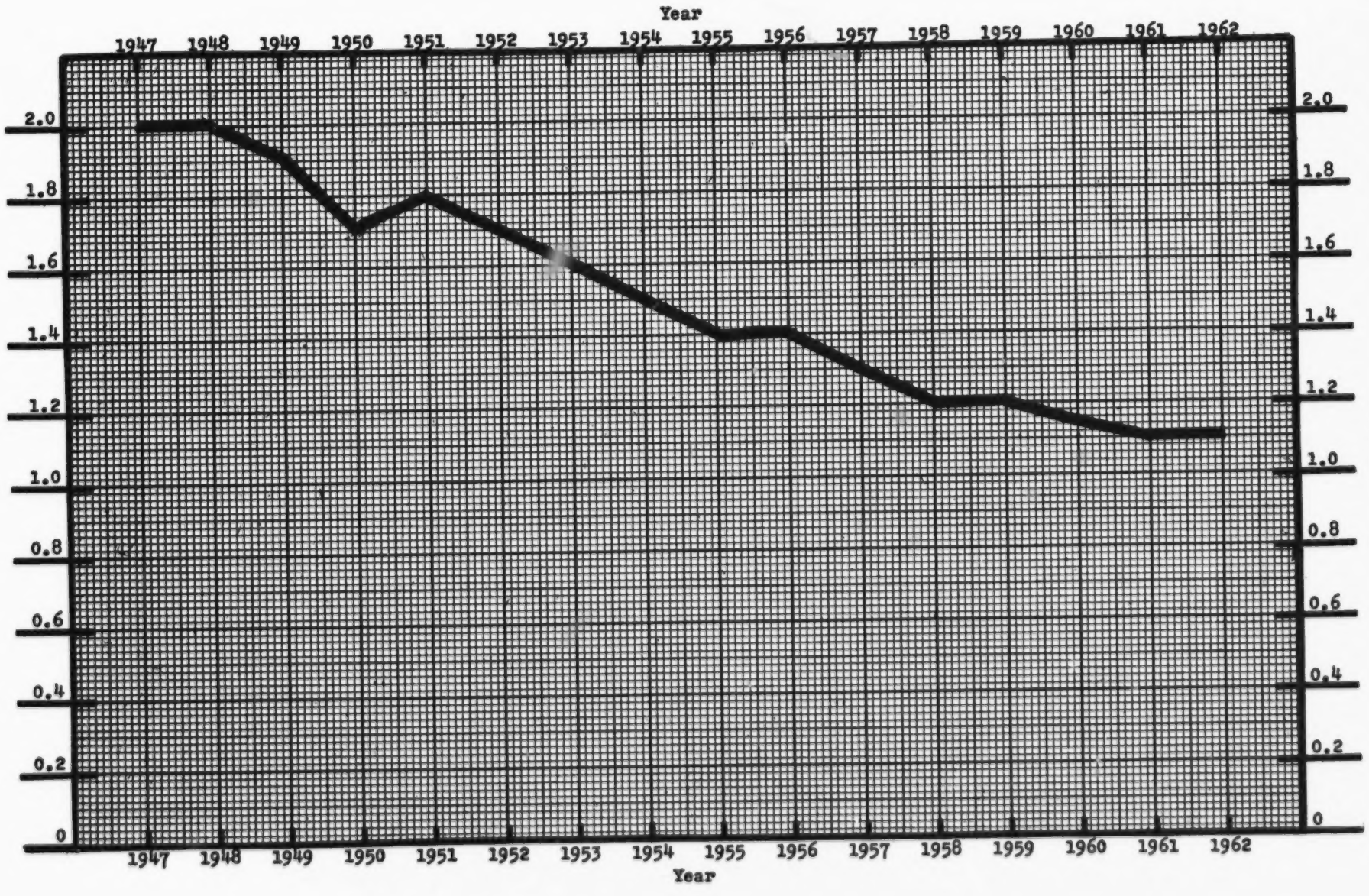


Table 4--Estimated number of first-time college students per 1,000 high school graduates

Year of high school graduation	Number of first-time college students per 1,000 high school graduates
1950	40.6
1951	41.6
1952	44.8
1953	50.8
1954	51.1
1955	51.2
1956	51.8
1957	52.8
1958	52.3
1959	52.8
1960	52.8

Source: Based on data in "Retention Rates of Fifth Graders to College Entrance," appearing in Trends, 1962 Edition, U. S. Department of Health, Education and Welfare, p. 46.

The Craftsmen - Professional and Technician Ratio

Perhaps of more immediate interest as an explanation of the declining number of apprentices in the post-World War II period is the substantial increase in the proportion of professional and technical workers in the employed labor force. While annual average employment of professional and technical workers has increased spectacularly--from 3.8 million in 1947 to 7.7 million in 1961--the annual average number of employed craftsmen has risen only modestly, moving from 7.8 million in 1947 to only 8.6 million in 1961. Relatively, therefore, the annual average number of craftsmen, as shown in figure 7, has declined in importance in the employed labor force. In 1947, the annual average number of employed craftsmen was twice as great as the annual average number of professional and technical workers; in 1961, this proportion had fallen to a ratio of 1.12 craftsmen to 1.00 professional and technical workers (figure 7).

The calculation of these ratios is, of course, affected by the substantial increase during the 1950-60 decade in the number of accountants, teachers, and other professional workers not directly involved in the productive process. It might be argued, therefore, that the ratios shown in table 5 may not reflect the actual ratio of craftsmen to professionals and technicians in the industrial sector of the economy.

There is little reason to doubt that the relative decline in the number of craftsmen vis a vis professionals and technicians, as shown in table 5, is a realistic approximation of the tendencies in the industrial sector. In construction, for example, where the proportion of professionals not directly employed in the productive process may be presumed to be relatively low, the number of male professional and technical workers in 1960, as indicated by

Table 5--Annual average employment: Ratio of craftsmen, foremen and kindred workers to professional, technical and kindred workers, 1947-61

Year	(1) Craftsmen, foremen and kindred workers	(2) Professional and technical workers	(3) Ratio of (1) to (2)
1947	7,754	3,795	2.04
1948	8,119	3,977	2.04
1949	7,625	4,028	1.89
1950	7,670	4,490	1.71
1951	8,434	4,788	1.76
1952	8,743	5,092	1.72
1953	8,588	5,448	1.58
1954	8,311	5,588	1.49
1955	8,328	5,792	1.44
1956	8,693	6,096	1.43
1957	8,664	6,468	1.34
1958	8,469	6,961	1.22
1959	8,561	7,143	1.20
1960	8,560	7,475	1.15
1961	8,623	7,705	1.12
1962	8,678	8,040	1.08

Source: Table A-7, 1964 Manpower Report of the President, p. 199.

table 6, was 34 percent greater than in 1950, but the number of craftsmen was only 5 percent greater. As a result, the ratio of craftsmen to professional and technical workers fell from 15 to 1 in 1950 to 12 to 1 in 1960, a decline of 21 percent. In manufacturing, the number of male craftsmen in 1960 was 21 percent greater than in 1950, but the number of professional and technical workers in 1960 almost doubled. As a consequence, the ratio of craftsmen to professional and technical workers decreased from 4.4 to 1 in 1950 to 2.7 to 1 in 1960, a decline of 39 percent.

* * *

Table 6--Ratio of craftsmen, foremen and kindred workers to professional, technical and kindred workers, 1950 and 1960

Year	Manufacturing			Construction		
	(1) Craftsmen, foremen and kindred workers	(2) Professional and technical workers	(3) Ratio of (1) to (2)	(4) Craftsmen, foremen and kindred workers	(5) Professional and technical workers	(6) Ratio of (4) to (5)
Total, both sexes						
1950.....	2,845,300	704,631	4.0	1,951,383	130,357	15.0
1960.....	3,431,044	1,328,491	2.6	2,049,036	175,555	11.7
1960 as percent of 1950.....	120.6	188.5	65.0	105.0	134.7	78.0
Males						
1950.....	2,714,610	620,406	4.4	1,936,936	127,332	15.2
1960.....	3,289,831	1,206,568	2.7	2,038,776	170,576	12.0
1960 as percent of 1950.....	121.2	194.5	61.4	105.3	134.0	78.9

Source: U. S. Census of Population, U. S. Summary: Detailed Characteristics. Table 209, for 1960 data; table 134 for 1950 data.

Paralleling the decline in the annual average number of craftsmen relative to professional and technical workers during this period, has been a gradual and persistent increase in unemployment rates among craftsmen. Indeed, as table 7 indicates, unemployment rates of craftsmen and of all workers have not differed very much in the years since V-J Day. Although unemployment among professional and technical workers also rose during these years, it never exceeded the 2 percent level from 1947 to 1961, and in many of these years fluctuated between 1.0 percent and 1.7 percent.

Table 7--Unemployment rates for craftsmen, foremen and kindred workers, and for all workers

Year	Craftsmen et al	All workers
1947	3.8	3.6
1948	2.9	3.4
1949	5.9	5.5
1950	5.6	5.0
1951	2.6	3.0
1952	2.4	2.7
1953	2.6	2.5
1954	4.9	5.0
1955	4.0	4.0
1956	3.2	3.8
1957	3.8	4.3
1958	6.8	6.8
1959	5.3	5.5
1960	5.3	5.6
1961	6.3	6.7
1962	5.1	5.6

Source: Table A-9, 1964 Manpower Report of the President, p. 201.

CONCLUSION

Of the many factors which impinge on the apprenticeship system, only three have been considered: Unemployment, changes in the occupational composition of workers in industry, and the increasing number of high school graduates who enter college or the university. Of these factors, the analysis has emphasized unemployment, largely because of the obvious, but long neglected need to consider apprenticeship in terms of labor market forces.

The analysis has suggested a direct association between changes in the completion rates of apprentices and unemployment, as well as an inverse relationship between the number of new apprentices and the level of employment. The long-term prognosis for the American apprenticeship system, as many see it, is pessimistic--"many thoughtful students . . . seriously believe that apprenticeship is now obsolete. "9/ Others, not quite as pessimistic, believe "that it is not completely moribund," and "that the policy and the program should be radically revamped. "9/

It is possible, however, that neither optimism nor pessimism are in order, that judgments about apprenticeship based solely on past trends are irrelevant. To the extent that efforts to reduce unemployment, for example, are successful, it appears likely that apprentices may increase in number.

9/ Felician F. Foltman, "Apprenticeship and Skill Training--A Trial Balance," Monthly Labor Review, January 1964.

Recognition that apprenticeship affects the public interest, may also result in formulation of public policies which could result in substantial increases in the number of apprentices. It is also possible that quantitative evaluations of apprenticeship are not the sole, or even the best means of judging the place of the system in the American economy. Although it is commonly known that apprenticeship serves to develop skilled craftsmen, it is frequently forgotten that this form of training also serves as a major means of training and developing leadmen, foremen, and supervisors--without whom management of American industry would face unsurmountable problems. In the words of an executive of one of the "Big Three" in the automotive industry, the apprenticeship system in his firm has utilized "apprentice graduates in positions ranging from analyst to executive Vice-President."10/ In his firm, he noted, a recent survey of apprentice graduates indicated that

> "33.7 percent of the apprentice graduates . . . were in salaried positions. Of this number, 51 were analysts, 37 coordinators, 252 designers, 299 engineers . . . 454 supervisors, 31 technicians, and 14 training specialists."10/

10/ Proceedings, 15th Annual Southern States Apprenticeship Conference, July 25-27, 1963.

APPENDIX

Registered apprentices in training, new registrants, completions, and cancellations, 1941-62
(adjusted to account for reporting revisions)

Year	In training on January 1--	New registrations 1/	Completions	Cancellations 2/	In training on December 31--
1941	18,300	14,177	1,289	5,051	26,137
1942	26,137	20,701	2,011	4,683	40,144
1943	40,144	11,661	1,715	6,975	43,115
1944	43,115	7,775	2,122	8,197	40,571
1945	40,571	23,040	1,568	5,078	56,965
1946	56,965	84,730	2,042	8,436	131,217
1947	131,217	94,238	7,311	25,190	192,954
1948	192,954	85,918	13,375	35,117	230,380
1949	230,380	66,745	25,045	41,257	230,823
1950	230,823	60,186	38,533	49,747	202,729
1951	202,729	63,881	38,754	56,845	171,011
1952	171,011	63,055	32,752	42,782	158,532
1953	158,532	73,198	28,378	43,094	160,258
1954	160,258	58,970	27,176	33,377	158,675
1955	158,675	66,747	24,445	26,255	174,722
1956	174,722	72,869	26,508	32,946	188,137
1957	188,137	58,463	29,760	31,149	185,691
1958	185,691	50,134	29,824	28,306	177,695
*1959	177,695	63,679	35,741	39,628	166,005
1960	166,005	58,129	30,920	32,086	161,128
1961	161,128	48,889	28,282	26,086	155,649
1962	155,649	55,321	25,918	26,434	158,616
1963	158,616				

*Major revision in reporting system effected this year.

1/ Includes reinstatements.
2/ Includes suspensions.

Source: U. S. Department of Labor, Bureau of Apprenticeship and Training, Division of Research.

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